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**FROM 'SICK MAN' TO 'LIVING LAB' – THE NARRATIVE OF SCOTTISH HEALTH SINCE
DEVOLUTION**

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Introduction

Two of the principal claims made for devolution were that it would increase the autonomy of Scottish government and administration on the one hand and its accountability on the other. Scottish government would be free to develop 'Scottish solutions to Scottish problems' while at the same time being more immediately representative of Scottish demands and concerns ([Freeman, 2007](#)).

The road to the independence referendum may have begun with devolution in the late 1990s, but a key question is: what have been the impacts on health and clinical research since the process of devolution was initiated? The impact of devolution on key areas of life, such as health and medical research is undoubtedly important. Building high quality medical research infrastructure in Scotland and retaining healthcare and research expertise is a priority in terms of improving understanding of the aetiology of disease and diagnosing and developing therapeutic treatments to benefit the Scottish population. In some cases, the research drive might include pharmaceutical companies investing and/or collaborating with Scottish facilities to bring both health and wealth benefits to Scotland.

This paper identifies and interrogates the change of narratives, relevant to the health debate under devolution, which frames discussions around potential Scottish independence. Pre-devolution there is a strong sense of Scotland as having unique health problems and hence, the '*sick man of Europe*' label, which required policy responses from the devolved government and the new powers it acquired. Under devolution, this engendered a second narrative built around the '*living lab*' concept. So here, we see a significant change in narrative emphasis from the pejorative Scotland as the 'sick man of Europe' to a more positive rhetoric about the many opportunities for clinical research that emerge from a sick population and could attract inward investment to a devolved Scotland. This shift in narrative, we suggest, is linked to a specific set of policy initiatives. In 1998, the Scotland Act (<https://www.gov.uk/devolution-settlement-scotland>) created a devolved Scottish nation giving significant powers to the Scottish Executive and Parliament over matters that were previously controlled by Westminster, including that of 'health and social work' ([Curtice, 2002](#)). Since devolution a number of policy changes and initiatives, such as 'Our National Health: A plan for action, a plan for change' (Scottish Executive 2000), as well as the adoption of a broad Life Science Strategy (2005) alongside increased funding by Scotland's Chief Scientist Office (CSO) for managed clinical research networks have occurred.¹

Devolution provided the opportunity to develop a national strategy for Scotland regarding health tailored to the unique characteristics of the demographic population. Furthermore, it allowed the creation of infrastructures, such as disease registers, genome wide population databases, as well as electronic research platforms in Scotland in order to access information about the health of the population. We contend that carefully constructed infrastructures instigated by and led with key figures in the healthcare system directed attention to the 'usefulness' of Scotland in terms of its population being a valuable national resource for clinical trials, and therefore, an attractive place for

¹ The definition of Managed Clinical Networks is 'linked groups of health professionals and organisations from primary, secondary and tertiary care, working in a co-ordinated manner, unconstrained by existing professional and Health Board boundaries, to ensure equitable provision of high quality clinically effective services throughout Scotland'. <http://www.scotland.gov.uk/Publications/2002/04/14452/1988>

inward investment. Our key question is how did the ‘living lab’ concept and the pulling together of a health and wealth agenda emerge from the narrative of Scotland as the sick man of Europe? More specifically, what features of the Scottish health ‘ecology’² – could and were presented as attractive investment opportunities for stakeholders in the life sciences, biotechnology and pharmaceutical companies, research councils and venture capitalists, both within the UK and internationally? There were three unique selling points about Scotland that helped the transformation from Sick Man to Living Lab:

Table 1: Scotland’s Story as a Unique Selling Point for Medical Research

Identification of the main interlinked discourses used to justify Scotland as a unique selling point and attraction for medical research:
a.) A unique population insofar as its purported lack of geographic mobility – ‘stay put’ allows the possibility to exploit genetic and historic pedigree of individuals and groups.
b.) ‘Stay-put’ also means the potential to identify medical research or clinical trial participants through the ability to link health information to medical records, as well as registries of disease via the Community Health Index.
c.) As having a population willing to participate in clinical trials (partly due to knowing or having experiences of the diseases that have led to the label of ‘Sick Man of Europe’ and leaving a health legacy for others) can be exploited through the establishment of clinical networks, as well as databases.

We contend that since devolution, the Scottish healthcare ecology has been constructed as being uniquely positioned to fulfil the requirements of a robust and locally responsive medical research system. That is, having a viable and willing population to conduct research on or with, alongside an informatics system and healthcare infrastructure that enables researchers to identify required cohorts for clinical studies is core to the research system. In terms of the implications of Scottish independence, this institutional and healthcare ecology that has evolved over the last 40 years, and the unique disease related characteristics of the current population, are unlikely to change dramatically. Further, as the opening quotation suggests, one of the main arguments for devolution circulated around issues of being more responsive to the unique Scottish health situation; we can also consider what were the benefits and limitations of this approach, in terms of such things as scalability and the role of local networks, for example. However, the fiscal challenges engendered by full independence (that were, arguably, not present under devolution) would mean that repercussions for the Scottish health landscape might be far more dramatic and have a more divisive impact. Questions about how clinical research funding, and the intuitional ecology of health research may change under independence is beyond the scope of this working paper, but is addressed in the companion piece by Mittra *et al.*

The structure of this paper is as follows. First, we briefly discuss data that suggests that Scotland has a particular health topography and set of public health challenges, which make it of interest and value for clinical and medical research, and that was historically structured around the narrative of “Scotland as the sick man of Europe”. We then

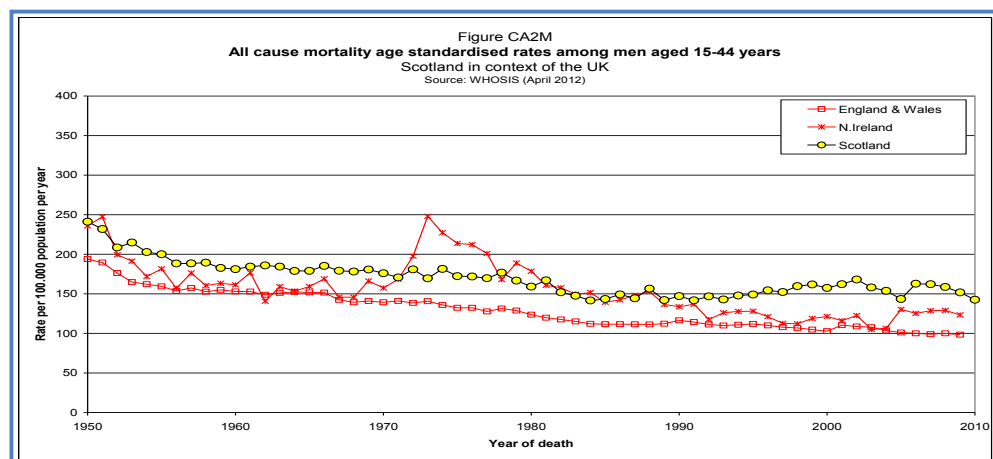
² The term ‘ecology’ is preferred here as it indicates the **relationship** between the Scottish population and its political, economic and social environment. Whilst ‘environment’ implies non-human surroundings the preferred term ecology carries the connotation of inter-relationships between individuals and their settings. The term ecosystem, although useful, does not emphasise the human within the relationship between the generic organism-environment.

discuss how a second narrative, and associated institutional infrastructure and practices, were enacted to exploit this status for public health and wealth benefits – this was based on three unique selling points around the identification, recruitment and participation of the population – the ‘living lab’. We then identify four innovative case studies in order to interrogate the notion of Scotland’s narrative as a living lab and national resource for international research investment. The discussion is structured around a description of the four case studies, which also demonstrate progress and scalability; for example, the community health index was a necessary precursor to post devolution initiatives, such as the Scottish Health Informatics Programmes, as well as the Diabetes Register. The Diabetes Register was key in demonstrating therapeutic gain for the patient, as well as encouraging them to register. Identification of individuals is a necessary, but insufficient, condition to participation - high levels of participation are required for successful medical research and clinical trials, such as WOSCOPs, which served to demonstrate the feasibility and efficiency of conducting clinical trials in Scotland. Post-devolution, Get Randomised, SHARE and Generation Scotland built upon this. We end by discussing the broader context of scalability, locality and the evolution since devolution.

From the Sick Man of Europe to the ‘Living Lab’ for Health Research

Both pre- and post-devolution Scotland has had the unenviable title of the ‘Sick Man of Europe,’ and when compared to 19 other European countries, Scotland remains the sick man (and woman) of Europe. ‘Scotland has had the highest mortality in Western Europe among working age men and women since the late 1970s’ ([Whyte and Ajetunmobi, 2012](#)). Although mortality rates for the Scottish population are falling in line with other European countries, they still remain higher than other countries and have been so since the Seventies. In terms of absolute trends, and in relation to Scotland’s relative position in a Western European, context improvements in conditions, such as lung cancer and heart disease are found amongst men – although liver disease is on the increase in women ([Whyte and Ajetunmobi, 2012](#)). The contrast can be made closer to home when national comparisons are made - the mortality rate for younger males in Scotland is 54 percent higher in 2009 than England and Wales as shown by Figure 1:

Figure 1:
Mortality
amongst men
aged 15 – 44
years
(Scotland in
context of the
UK):



Headlines from popular media serve to highlight this status. For example, the article “Scotland the Grave as health worsens: We’re the sickest in UK”, reported that Scotland is the sickest place in Britain, with more people dying and increasing numbers of mental

illness cases. It further quoted Nicola Sturgeon, SNP health spokesperson at the time, as stating: "Sadly our unenviable position as the sick man of Europe shows no sign of improving. These figures also highlight that health inequalities across Scotland have still to be tackled" (Daily Record, 15 February 2001). For some this has also been taken as evidence of the failure of London Rule. In the article, "A deathly message spelled out to Scotland; Opposition accuses Executive over health as study shows unflattering comparisons with eastern Europe", it was reported that Scotland's death rate was 11.8 per 1000 of population, putting it behind Eastern European nations, such as Czech Republic, Slovakia and Poland, and on a close footing with Romania, Russia and Hungary. It quoted then Shadow Health Minister Kay Ullrich as stating that such figures were a "damning indictment" of London Rule and supported the case for independence. She further stated: "Scotland is a resource-rich, oil-rich country, yet we have a similar mortality rate to that of Romania. These statistics are clearly connected to the widespread poverty that exists in Scotland and our high incidence of cancer and heart disease" (Herald, 21 July 2000).

Scottish cities, such as Glasgow, also appear to suffer from poorer health outcomes, beyond what would be expected even taking into account income deprivation³. The 'Glasgow Effect', as it is termed, is used to name this phenomenon of 'excessive mortality' beyond that which would be expected due to the link with poverty and deprivation. In a study of three UK cities with high levels of mortality and deprivation (Manchester, Liverpool and Glasgow) researchers suggest that:

Premature mortality (under 65 years) in Glasgow has been shown to be 30% higher than in the identically deprived UK cities of Liverpool and Manchester, with deaths at all ages almost 15% higher. This 'excess' has been shown for all adult age groups, both sexes and across different neighbourhood types (deprived and non-deprived) (Walsh et al., 2010).⁴

Post-devolution, the discourse around Scotland's reputation as 'the sick man of Europe'⁵ appears gradually to have turned into a 'population clinical research' image offered as an asset in terms of attracting investment in research.

For example, the Health Science Scotland website (Figure 2) offers 'high rates of complex diseases' as a unique resource for health researchers'.⁶

³ Generally a link has been made between inner city levels of income deprivation and health outcomes WALSH, D., BENDEL, N., JONES, R. & HANLON, P. 2010. Investigating a 'Glasgow Effect': Why do equally deprived UK cities experience different health outcomes? http://www.gcph.co.uk/assets/0000/0087/Investigating_a_Glasgow_Effect_for_web.pdf, Accessed May 2013..

⁴ The authors of the research suggest that social capital may have some effect, 'differences in some aspects of social capital (trust and reciprocity, and social participation) between Glasgow and the two English cities which could potentially impact on levels of health and wellbeing in the population: differences between the samples in social participation e.g. Volunteering, trust and reciprocity are clear and consistent, and are supported by analyses of related 'values' such as individualism and benevolence.' (Walsh et al., 2010).

⁵ Scotland not the only country to be labelled as such as both Turkey and France are also contenders for the title as well as the European Union itself in reference to its economic status.

⁶ 'Health Science Scotland (previously called Scottish Academic Health Science Collaboration) is a partnership of medical universities and their associated NHS Health Boards in Scotland to promote excellence in the field of clinical and translational medicine' http://www.healthsciencescotland.com/104_About+Us.html

Figure 2: Screen-shot of Health Science Scotland

Reference:

http://www.healthsciencescotland.com/110_Our+Population.html



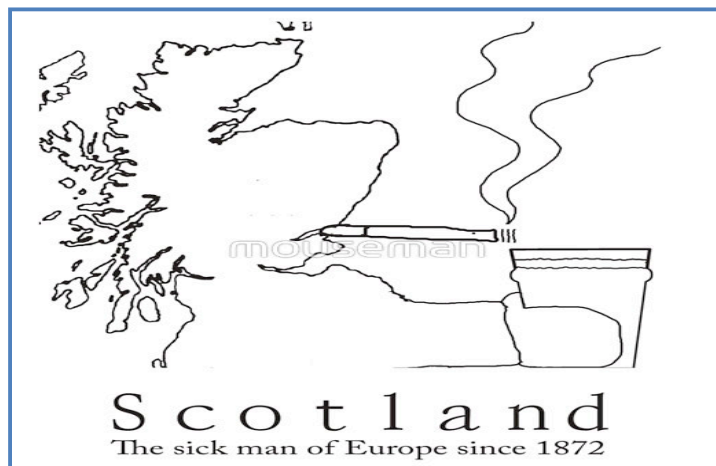
The Vice-President of clinical trials company, Quintiles, argued that, ‘Scotland has a significant burden of disease and there is huge need to speed the drug development process in order to develop treatments that enable people to live healthier lives’ (www.scotland.gov.uk/News/Releases/2012/nhsresearch accessed June 2013).

One significant change occurring over the last decade has been to use such negative imagery as an asset – it is turned into a positive narrative used by the media policymakers and medical professionals to attract investment in Scotland, despite regional, gender and age differences in the reality of the ‘sick man’. Despite regional, gender and age differences in the reality of the ‘sick man’⁷, this status, it is believed, has the potential to attract clinical and health research to Scotland. The emphasis on the mortality and morbidity rates remains a serious health problem. However, it seems since devolution that this is not only a public health challenge, but presents a clinical research opportunity.

Figure 3: Scotland as the Sick Man of Europe.

Reference:

<http://www.redbubble.com/people/mouseman/works/5796660-scotland-sick-man-of-europe?p=sticker>



An additional attribute to add to the ‘sick’ tag is the advantage for clinical researchers of a population that ‘stays-put’. That is, Scotland’s population has remained relatively static and stationary with little out-migration, allowing researchers the possibility of both

⁷ This stereotype of the Scottish population is not gender-blind focussing on men only, rather when compared to nineteen other European countries Scottish female mortality is also higher than the mean (Whyte and Ajetunmobi, 2012).

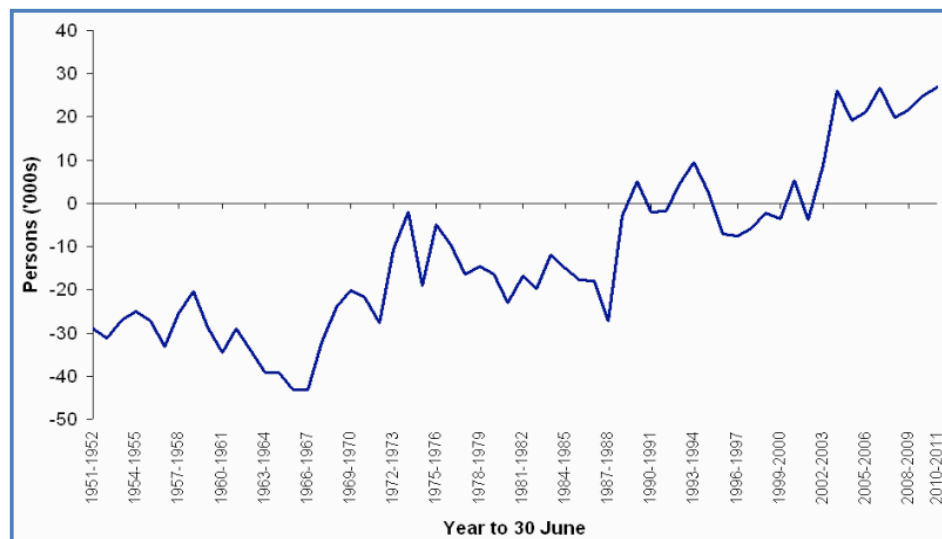
traceability and genealogy. This narrative is one that focuses upon locating individuals in their current environments, as well as their next-of-kin. Health Scotland's website under the heading 'Scotland's strengths' explicitly refers to this lack of mobility as a strength for medical research:

Scotland is ideal...because the population is remarkably stable. Individuals may emigrate, but typically many relatives remain behind. Over the generations, Scotland has become a new home for many incomers, who rarely leave once settled. It is therefore relatively easy to undertake large scale, long-term studies of health and health outcomes.

(http://www.generationscotland.org/index.php?option=com_content&view=article&id=52&Itemid=124, accessed June 2013)

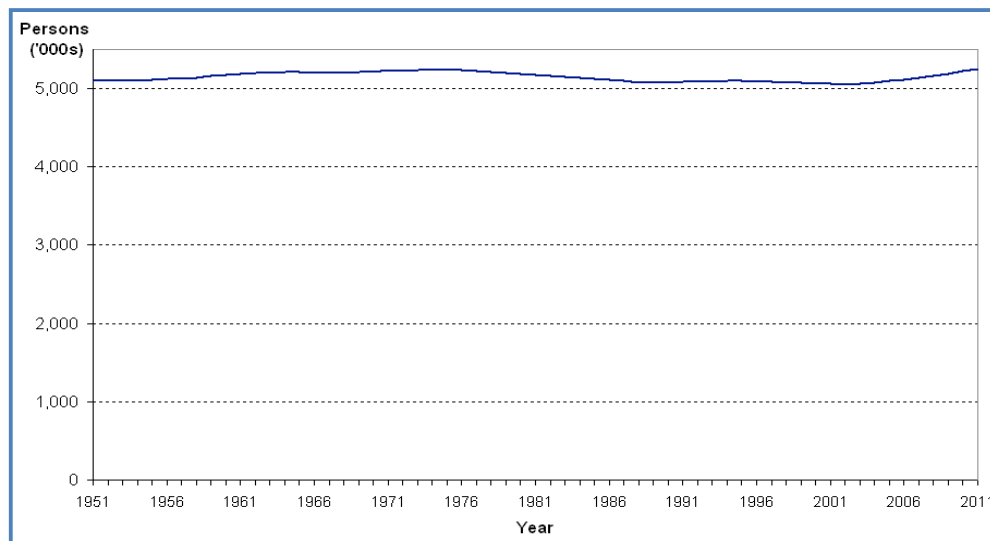
For example, Scotland's population as of 30 June 2011 stood at a high of 5,254,800 constituting almost 200,000 more people in Scotland compared with mid-2002 due to net in-migration of 27000. See Table 2 below:

Table 2: Net migration, Scotland, 1951-2011



Reference: <http://www.gro-scotland.gov.uk/files2/stats/high-level-summary/j11198/j1119806.htm>

However, this rise should be contextualised historically with trends demonstrating that Scotland's population has remained relatively stable for 50 years. Scotland has had little out-migration since the mid-1960s with less and less of the population moving to live elsewhere as shown in Table 3:

Table 3: Estimated population of Scotland, 1951-2011

Reference: <http://www.gro-scotland.gov.uk/files2/stats/high-level-summary/j11198/j1119801.htm>

In sum, Scotland's sick stay-put population offers not only a valuable resource to understand how disease affects the population and sub-groups therein varied by gender, class and location, but also has the ability to introduce both longitudinal and prospective medical studies. Furthermore, as discussed later in the paper, in the case of Generation Scotland, the relatively static population can offer the opportunity to collect data and samples from a population that is relatively stable thereby identifying the hereditary components of a particular disease.

Case Study Examples of the Living Lab Narrative

As has been discussed above, historically Scotland's health topography can be characterised as a 'sick stay-put' population. The 'Sick Man of Europe', however, became transformed into one that was not seen as a negative label, but one that can offer unique benefits to researchers. The following discussion is structured around four case studies that best exemplify three unique selling points about the Scottish population as a 'living lab' – each demonstrating different facets of the identification, recruitment and participation of the population in medical research and clinical trials:

- From CHI to Scottish Diabetes Research Network
- Scottish Health Informatics Programme
- Clinical Trials, SHARE and 'Get Randomised'
- Generation Scotland: the Scottish Family Health Study

It must be noted that these case examples were built on basic infrastructures that were introduced pre-devolution, but they have evolved considerably in the post-devolution era. Also, we do not want to suggest that Scotland was isolated from global developments, such as: the mapping of the human genome, the introduction of the EU clinical trial directives and pan-European regulatory harmonisation; the trend for longitudinal studies and an increasing interest in pharmacogenomics, and more recently stratified medicine; and an amalgamation of pharmaceutical and genomics attempts to understand individual

and group responses to drugs and potential adverse effects (Mittra & Tait, 2012). Rather, the Scottish health topography could be thought of as an ideal location to assess and examine these broader global trends. With a population of a relatively small 5.2 million, Scotland could be the ideal 'living lab' for the exploration of, for example, longitudinal studies, DNA databases and stratified medicine, and could therefore be considered as 'local but global'. Hence, the infrastructure built around the living lab mapped directly onto the three component parts of what is required in order to conduct medical or clinical research, such as the availability of suitable participants (Stage 1), Identification of Participants (Stage 2) and their Participation (Stage 3).

Case Study 1: From Community Health Index to Diabetes Research Network

The issue of how the description arose of 'Scotland as the Sick Man' has been subject to some debate. For example, whether it is because Scotland collects reliable data about the mortality and morbidity rates within its population that demonstrates ill health, or alternatively, whether better data is collected because of increasing concern about Scotland's ill health status. Either way, the fact that cohort data exists at all is key to the selling of the 'living lab' status. Data collection began in the 1970s, when every individual in Scotland registered with a General Practitioner was issued a Community Health Index Number (hereafter CHI). It is estimated that approximately 96 percent of the population have this identifier (*Scotland Performs*, Scottish Government, 2009, retrieved 2010-03-15). The CHI number is attached to a person's medical records from birth and is a ten digit reference, with the first six digits referring to day of birth, followed by two numbers identifying gender, and completed with two random digits. The rationale for the introduction of the CHI was primarily therapeutic, such that a patient can be identified correctly regardless of a change in their personal circumstances and of the medical environment they are being treated in – recent estimates suggest that hospitals now use CHI in 93 percent of activities (<http://www.scot-ship.ac.uk/overview>). The CHI register contains data on address, postcode, GP, date and region of registration, and where relevant, date of death, allowing the demographic profile of Scotland, death and patient migration to be easily analysed (<http://www.scot-ship.ac.uk/overview>). Hence the primary purpose for CHI has been that of comprehensive and longitudinal record of an individual's health that would be transferable and accessible in any primary, secondary or tertiary medical setting. However, an increasingly important secondary function that arose is the usefulness of the CHI for research purposes, either for clinical research or participation in clinical trials. The key importance of the Community Health Index is that its existence enables research with a person's medical records that are, to all intents and purposes, anonymous (Robling et al., 2004; Damschroder et al., 2007).

This function of allowing anonymous medical research through the CHI was utilised to good effect in the late Nineties **prior to devolution**, where the advantage to be gained of linking pre-existing health data in order to identify a population with a particular medical condition that would otherwise have usually been identified through GP registers was demonstrated. Andrew Morris and colleagues argued in the British Medical Journal that this method was more efficient at identifying those diagnosed with diabetes, because using CHI also enabled those who were unaware they might have diabetes could also be identified (Morris *et al*, 1997). This can be viewed as a key point in the development of using CHI as a means in which to access patient records for research purposes that post-devolution led to research platforms, such as Scottish Health Informatics Platform to be funded (discussed below).

Pre-devolution, CHI formed the basis of and allowed the development of the seven clinical research networks (called the 'Clinical Research Networks') in Scotland. Both cancer and primary care were established pre-devolution; however, post-devolution five others joined and were funded by the CSO in 2006, including: Children's Research Network (ScotCRN), Diabetes (SDRN), Stroke (SSRN), Mental Health (SMHRN) and Dementia (SDCRN). The Scottish Diabetes Research Network developed a National Research Register for patients wishing to take part in research. The Scottish Care Information – Diabetes Collaboration (SCI-DC) is a system in which the willingness of patients to be contacted about studies by researchers. Such a system is being campaigned for by Diabetes UK Cymru, stating: 'People with diabetes in Scotland enjoy much better control of their medical records and have better access to what is planned for their care. The system they have introduced is called SCI-DC (Scottish Care Information - Diabetes Collaboration), the shared patient record for diabetes in Scotland' (http://www.diabetes.org.uk/In_Your_Area/Wales/Campaigning/SCI-DC/).

The Scottish **national** diabetes database or register has complete medical records from Scotland's 239,000 patients with diabetes. The database allows individual doctors access to their patients' full medical history, and as Professor Andrew Morris, Scotland's now current Chief Scientist for Health notes: "It has been a major driver of quality. And that has to be the main reason you do this. But if you, with good governance, can anonymise that data, you have enormous secondary value for epidemiology studies".⁸ In 2005, for example, Morris and his colleagues used the records to find a connection between the diabetes drug metformin and cancer protection' (Vogel). The success of the Scottish Diabetes Network in recruiting patients is demonstrated by a 233 percent increase, since 2007 – 2011, from 2655 to 8830 (Scottish Diabetes Research Network., 2012). It is also one which appears to attract and retain the investment of commercial companies who manufacture insulin such as Novo Nordisk (Scottish Diabetes Research Network, 2012). A key point in the Scottish context whereby encouraging medical research not only has repercussions for improving health, but for increased national wealth.

Case Study 2: From Diabetes networks to the Scottish Health Informatics Programme:

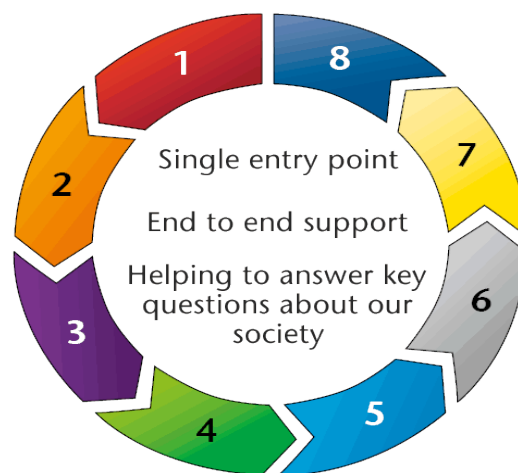
Scotland has some of the best health service data in the world. Few other countries have information that combines high quality data, consistency, national coverage and the ability to link data to allow patient based analysis and follow up. The Information Services Division (ISD) is a division of National Services Scotland, part of NHS Scotland. ISD provides health information, health intelligence, statistical services and advice that support the NHS in progressing quality improvement in health and care and facilitates robust planning and decision-making (<http://www.isdscotland.org/index.asp>, accessed July 2013).

CHI and the construction of the disease networks demonstrated that there were means in which sectors of the Scottish population could be identified and a register kept of their willingness to be contacted by researchers. What was missing was the infrastructure to facilitate research access to these registers and others. Post-devolution related to streamlining this access to patients. The Scottish Health Informatics Programme (SHIP)

is a research facilitation organisation, which seeks to bring together researchers with anonymised data from individuals from both their health records from CHI, but also other information relating, for example, from the DVLA, education and other administrative records. It does so through providing a secure, dynamic way of bringing separate strands of data from different organisations, anonymising them and then sending them to the researcher. It also provides training to researchers about the use of the database. SHIP provides a medium in which researchers and data custodians meet to negotiate access prior to seeking ethical approval. SHIP provides 'safe havens': a term that is used to indicate a physical or virtual place where the data is fed back to researchers in an encrypted form. The Information Services Division (ISD) Scotland is a NHS organisation that provides robust statistical data and intelligence in order to inform decisions about how to improve the National Health Service utilising the CHI numbers of the population. ISD contributes to SHIP through providing an electronic Data Research and Innovation Service (eDRIS), as well as a Research Coordinator as the single point of contact.

Figure 4: eDRIS

1. A named Person from start to finish
2. Help with study design
3. Provide expert advice on coding, terminology, meta data and study feasibility
4. Agree deliverables and timelines
5. Liaison with data suppliers to secure data
6. Facilitate completion of required permissions
7. Liaison with technical infrastructure (safe havens)
8. Provide analyses, interpretation and intelligence about data (where required)



Reference: <http://www.isdscotland.org/Products-and-Services/eDRIS/>

This is a precedent arguably set with the construction of the Scottish national diabetes database (discussed above). The fact that SHIP was funded and the ethical process itself streamlined was highlighted and did not go unnoticed:

Scotland is also leading the way in health research. NHS Research Scotland's efforts to dramatically cut the time required to start projects has resulted in the country now offering one of Europe's fastest R&D approval times for conducting clinical research (Alex Neil MSP – Life Goals, 20 March 2013, <http://www.scienceomega.com/article/962/life-goals>).

'Scotland's intellectual and technical resources, coupled with recent advances in streamlining processes for conducting clinical research, makes Scotland an extremely attractive location for clinical research,' said Roger Newbery, Ph.D., PPD's vice president of clinical management for Europe, Middle East and Africa.

Importantly, SHIP was funded by a conglomeration of the Wellcome Trust, the Medical Research Council and the Economic and Social Research Council, which are all **UK-based** medical charities or government funding bodies.

Case Study 3: From Clinical trials to Get Randomised

The identification of possible participants represents a key stage in the general clinical research process, and with CHI, disease registers and SHIP, the infrastructure was now in place to facilitate the identification of individuals across Scotland. However, this is of little utility without the ability or knowledge that people will participate. Meta review of studies show that of 236 published studies only 50 percent reached their recruitment targets (McDonald 2006; Foy 2003; Hidich 2001; Charlston 1984). However, precedents pre-devolution indicated that Scotland had a strength in this regard. In 1989, Bristol-Myers Squibb, a global pharmaceutical company, invested in The West of Scotland Coronary Prevention Study (WOSCOPs), which was the first clinical trial in Scotland to demonstrate a significant reduction in cardiovascular events with statin therapy for primary prevention (Ford *et al.*, 2007). Through population screening the clinical trial randomised 6595 middle-aged men with hyperlipidaemia and no previous history of myocardia infraction to pravastatin or placebo. The trial, which was to develop into a longitudinal study, demonstrated a 31 percent relative risk reduction of coronary events, an effect that was seen within 6 months of randomisation.

The wider significance of WOSCOP indicated the potential to attract and maintain investment, as well as the **ability to recruit significant numbers of participants**. The Dundee WOSCOPS indicated that Scotland could attract international pharmaceutical company investment and recruit sufficient numbers of participants to develop robust data that would have long-term impact on chronic conditions. One large-scale clinical trial testing the efficacy of 2nd generation NSAIDs, Standard Care versus Celecoxib Outcome Trial (SCOT), based in the Medicine Monitoring Unit at the University of Dundee, is positioned as such:

In most parts of the world it would not be possible to do the SCOT study in its present form...The CHI number is attached to prescription data as well as to the information collected by hospitals on the illnesses of the patients who receive treatment there. People who take part in SCOT agree to the research team having access to their prescribing information. This makes it possible to work out the relative safety of these drugs over the course of the study (<http://www.scottrial.co.uk/how.htm>).

Clinical trials require high participation rates in order to produce generalisable, cost-effective and timely research. Low recruitment rates increase the probability of unrepresentative samples through non-response and volunteer biases thereby undermining the generalisability and usefulness of the study findings (McColl *et al.*, 2001; Bland, 1996). Post-devolution, the narrative is one that the willingness of the Scottish population is often quoted as a key attraction for those willing to invest:

A significant percentage of Scotland's 5.3 million people have participated in a clinical trial, and Scotland has a high incidence and prevalence of diseases in key therapeutic areas of focus in clinical research

(<http://www.lifesciencesscotland.com/connections/news/news-content/scottish-government-and-ppd-announce-strategic-alliance-to-advance-clinical-research-in-scotland.aspx>).

The UK Clinical Trials Gateway (UKCTG) conducted a survey of patient and public attitudes towards clinical trials.⁹ Of the 627 online survey respondents, most self-identified as either being a patient, a patient's carer or a representative (83 percent). Just under a third (28 percent) had taken part in a clinical trial and 64 percent said that they would like to find out more about recruiting in the area (UK Clinical Trials Gateway, 2013). Similar figures emerged with a Wellcome Trust Monitor report of survey results, which suggest that over 60 percent would be willing to take part in medical research that gives access to their anonymised medical records. However, only 22 percent of those in a UK household had participated in one (Ipsos Mori, 2013).¹⁰ Latest figures from the National Institute of Health Research in England show that clinical trial participation has increased dramatically over the last five years; numbers, it is said, to be trebling in all UK areas (<http://www.bbc.co.uk/news/health-22594635>).

However, little information is available about whether or not the studies are actual clinical trials or not. Indeed, the veracity of the data and the potential for under-reporting in this area might in itself have caused the 'increase' due to the introduction of better reporting.¹¹ Important to our discussion here is that there are no pre-devolution figures in terms of participation rates in Scotland with which to establish this, nor will trends in participation rates be established until further information has been collected from Health Boards in the future (personal communication, CSO 2013).¹² In order to increase awareness in the Scottish population about randomised clinical trials in 2008, a campaign was launched in Scotland called 'Get Randomised' (see Figure 5 below).

⁹In 2000, comparative international data does suggest significant variation in the ability to recruit required numbers to trials, with Switzerland, the Czech Republic, France and the USA all achieving over 100%, the UK meeting less than 80%, and Italy only marginally more than 40% of the target' SMITH, R. 2000. UK is losing market share in pharmaceutical research. *British Medical Journal*, 321, 1041..

¹⁰ In a study of 295 (AMERICAN?) participants (of which 188 were patients) authors conclude 'respondents view clinical trials as important, ethical, and as a means of attaining superior medical care' CASSILETH, B. R., LUSK, E. J., MILLER, D. S. & HURWITZ, S. 1982. Attitudes towards clinical trials among patients and the public *Journal of American Medical Association*, 248, 968-970 although only 13% had actually participated in one.

¹¹ 'The vast majority of those who take part in clinical trials are patients who have a specific illness which is being investigated. They will either get the best standard treatment or a novel therapy. While the number of people taking part has trebled in five years to nearly 650,000, the number of new NIHR trials has stayed broadly similar at between 1000-1500 per year. Healthy volunteers are also needed to test new treatments. They will usually get no personal benefit from the medicine they are testing although they do get paid for giving up their time. There are no exact figures for the number of healthy volunteers but the MHRA estimates about 8,000-9,000 take part in trials each year'. <http://www.bbc.co.uk/news/health-22594635>

¹² In relation to health research more generally the 2004/5 and 2009/10 UKCRC Health Research Analysis reports show that Scotland continues to punch above its weight in terms of the proportion of overall health research funding that comes to Scotland, although there is no pre-devolution baseline with which to compare those figures. In addition, data received by CSO from the NETSCC in Southampton (which manages the UK-wide health research programmes) suggest a higher success rate for Scottish led applications than the UK average and that, at least for 2011-12 and 2013-14, Scottish studies secured a greater than proportional share of the funding awarded (see personal communication, CSO).

Figure 5: Get Randomised

Although researchers reviewing the impact of the campaign conclude that it is possible to raise awareness of the importance of clinical trials, the media campaign itself did little to change people's stated willingness to participate which remained at approximately 30 percent (Mackenzie *et al*, 2010). Although the disease registers, such as the SDRN mentioned above, are attracting investment and participants – the consent given by their participants is not transferable to other banks or registers. Hence strategies, such as the Scottish Health Research Register (SHARE) are being put in place in order to encourage individuals to register their willingness to take part in clinical trials. Launched in 2012, it will establish a population subgroup with variations in their health that agree to allow SHARE to use the coded data in their various NHS computer records to check whether they might be suitable for health research studies

(http://www.registerforshare.org/news/New-SHARE-initiative-launched_2.html).

Case Study 4: From Databases to DNA Databases



This (Generation Scotland) is an ambitious project, which will provide invaluable data on how diseases such as diabetes, heart disease and mental illness are affected by genetic factors. It is another example of world-leading research from Scotland (Professor Anna Dominiczak, Head of the College of Medical, Veterinary and Life Sciences at the University of Glasgow,

http://www.generationscotland.org/images/stories/Press_Release_13Mar12.pdf).

At the same time that devolution was being proposed in Scotland other events in global medical science had turned attention towards the human genome. In Iceland, a nation not dissimilar to Scotland insofar as both have a relatively small and stable population, a Health Sector Database (HSD) was announced in 1998, proposing to bring together the genetic and medical information of the entire Icelandic population (Rose, 2001). In similar ways to the way that Iceland was 'sold' as a resource ripe for genetic exploration, in terms of its purportedly stable population, similar rhetoric were utilised in the Scottish bank for Generation Scotland: the Scottish Family Health Study¹³. Generation Scotland

¹³ There are a number of differences between the biobanks but for purposes here suffice to note that UK Biobank also collected DNA samples from the population of Scotland for the purpose of genetic
Gill Haddow, James Mittra, Ken Snowden, Elisabeth Barlow, David Wield

took the particular Scottish ecology and used it to good effect, epitomising the junction of relatively stable population, the disease prevalence in the population and the ability to locate and identify participants – all discussed above. From 2006 to 2011, Generation Scotland: The Scottish Family Health Study (from now on GS) invited individuals living in Scotland and aged between 35 – 55 years, with at least one sibling, to participate in Scotland's first population genetic data collection.¹⁴ The now Chief Scientist for Health for Scotland and Principal Investigator of Generation Scotland Professor Andrew Morris¹⁵ suggested:

Genetically inherited factors influence our risk of being affected by a number of common causes of ill health, including cancer, diabetes, heart disease, mental illness, obesity and stroke. We hope this study will help to unlock the secrets of Scots' health and bring real health benefits to those living with disease and to the next generation.

(<http://www.dundee.ac.uk/pressreleases/2011/march11/volunteers2.htm>, accessed June 2013).

GS aspires to become a gene identification vehicle into diseases that affect the Scottish population (e.g., cancer, heart disease and mental illness). GS differs from other genetic population data collections, such as UK Biobank, because in order to discover possible candidate genes for these diseases it recruits families, especially siblings and parents (Smith *et al*, 2006).¹⁶ Participants were asked to contribute a blood sample from which DNA will be extracted. Approximately, fifty national and international researchers have accessed the database

(<http://www.dundee.ac.uk/pressreleases/2011/march11/volunteers2.htm>). There is potential for GS and SHIP to make contributions to the study of pharmacogenomics – studying the genetics basis for adverse drug reaction either in relation to sub-groups of the population (stratified medicine)¹⁷ or to individuals (personalised medicine).

Survey results asking publics whether they **would** take part in genetic population data studies found that a quarter said that they would be very likely or certain to take part in the GS genetic research database (18 percent were very likely and 7 percent were certain to) (Haddow *et al*, 2011), but in terms of actual participation rates only half that number actually did when GS began to recruit (12.3 percent agreed) (Smith *et al*).¹⁸

disaggregation from environmental factors in disease causation. Generation Scotland's purpose was one of identifying genetic inheritance involved in disease transmission in families.

¹⁴ Generation Scotland is an umbrella term that relates to 3 different studies; however for our purposes here the Scottish Family Health Study was certainly more ambitious and costly.

¹⁵ Currently the Chief Scientist for Scotland as well as the PI in SHIP and was the lead author in the original work with using the CHI for diabetes research discussed above.

¹⁶ Family-based studies are considered the gold standard of such research because they avoid the problem of association studies, namely that of population stratification whereby an association is caused not by the underlying structure of the population and not an actual disease association (Carey, 2003). UK Biobank, on the other hand, recruits individuals in order to assess how these genes may interact with lifestyle factors (for further information on the relationship between the two studies see <http://www.ukbiobank.ac.uk/docs/GenerationScotlandandUKBiobanktwostudiesexplained.doc>).

¹⁷ An area that the MRC-NIHR will commit over £60 million to over the next 4 years
<http://www.mrc.ac.uk/Fundingopportunities/Highlightnotices/stratmed/index.htm>

¹⁸ Little is known about why families invited to take part in this type of research do so, especially in the case when a proband is acting as a 'proxy' recruiter and is a healthy volunteer with no known genetic (or otherwise) disease. Who will participate, who they will recruit and why has been shown by other US researchers to be dependent on the existence of family disease KREIGER, N., ASHBURY, F., Gill Haddow, James Mittra, Ken Snowden, Elisabeth Barlow, David Wield

Actual participants were also overall generally 'healthier and wealthier' than the Scottish population, appearing to be the 'worried well' dependent on the anxiety score as measured by General Health Questionnaire (Smith *et al*, 2012). Indeed, although the main reasons given for possible participation were: 'they wanted to help/think it's an important study/think it's the right thing to do' (61 percent), 'because it is interesting' (19 percent), 'because **they know someone who has a particular disease**' (18 percent), a minority admitted that they would participate because they 'want health feedback' (14 percent) (Haddow and Cunningham-Burley, 2004).¹⁹ We envisaged that feelings of national pride and identity would be a motivator for sections of the population to take part in clinical research, yet we found little reference made to ideas of nationalism or imagined communities as has been suggested by other researchers (Busby and Martin, 2006), and significantly, more mentioned of coming to the assistance of others.

Discussion and Conclusions

Scotland was and is constructed as the 'sick man of Europe' on the one hand, which existed pre-devolution, but post-devolution appears to have been promoted also as a unique, isolated population that as a national resource, a clinical trial population or 'living lab' for the research community. Scotland's reputation as a 'sick man' pre-dated devolution, although the narrative as a 'living lab' did not. Evolution is a process of incremental transformation and not a one-off event that immediately produces change, in this case the way in which medical research and healthcare was promoted in Scotland.²⁰ Post-devolution Scotland's health policy has not produced radical changes, compared for example, to the changes undertaken in England in the area of education. Devolution in Scotland was not an instant departure from the past and neither can it be divorced from the internal processes and external forces that existed previously and continue to exist post-devolution.

What we have identified, however, is a significant change in emphasis and narrative - the emphasis of Scotland's poor health as something that offers medical researchers 'population wide clinical research' with certain regions, in the West for example, offering fertile ground for clinical trials. Nonetheless, a 'sick and stay-put' population is of little value to researchers without the ability to identify and recruit study participants.

COTTERCHIO, M. & MACEY, J. 2001. A Qualitative Study of Subject Recruitment for Familial Cancer Research. *Annals of Epidemiology*, 11, 219-224, SORENSON JR., CHEUVRONT, B., BRUNING A., TALTON, S., DEVELLIS B., KOCH G., CALLANAN N. & FERNALD, G. 1996. Proband and parent assistance in identifying relatives for cystic fibrosis carrier testing. *American Journal of Medical Genetics* 63, 419-425., current data suggests that for GS participants it was also related to leaving a 'healthy legacy' as well for the family members it was more to do with persuasion and obligation. That is, family members participated because they were asked and felt obliged to or were persuaded to by the proband (Haddow 2010).

¹⁹ Research in Scotland on why elderly participants at risk of vascular disease took part in the study PROSPER (Prospective Study of Pravastatin in the Elderly at Risk) discovered that the 65% of those who enrolled in the study did so for reasons relating to self-interest (52.9%) or altruism (39.6%) TOLMIE, E. P., MUNGALL, M. M. B., LOUDEN, G., LINDSAY, G. S. & GAW, A. 2004. Understanding why older people participate in clinical trials: the experience of the Scottish PROSPER participants. *Age and Ageing*, 33, 374-378.. That is, research has demonstrated that participation in such studies (patients and disease registers) can be built along the lines of those who will benefit.

²⁰ Although some have argued that devolution was disruptive in terms of governance and policy with readjustment of key governmental and parliamentary units HAZELL, R. (ed.) 2000. *The State and the Nations: The First Year of Devolution in the United Kingdom*, Thorverton: Imprint Academic.

The Community Health Index was introduced in the late Seventies and its usefulness as an identification tool marginally pre-dated devolution; however, the emphasis on it to be used, for example, to construct disease registers came about post devolution. The ability to use the Community Health Index to trace and locate individuals has in the last ten years been pushed on with the development of the information technology and infrastructure to enhance access to the resource, such as SHIP. Moreover, because individuals or their families were 'sick' they were also willing to take part in clinical trials, medical research or genetic epidemiological studies.

Many of these ideas are interlinked, such as the ability to identify clinical trial population or a disease registry to a genetic population database, and many of these developments had precedents in order to demonstrate to funders that the ideas are feasible.

Researchers utilised previous successes in order to provide evidence that previous local successes could be *scaled up* in order to provide national studies in an ecology posited as ideal for such a venture. We argue that the concept of scalability is important in understanding post-devolution developments – for example, the Community Health Index (the unique identifier attached to the majority of the population's medical records), as well as the 'sick man' tag associated with the high mortality rates with the Scottish population, which is used strategically as evidence to attract investment.

The above four case studies have elaborated on the key themes around Scottish uniqueness that came with devolution, but also pre-dated it. Essentially there are elements of scalability, both in terms of evidence base around what had been accomplished before in Scotland in terms of medical research, as well as the Scottish ecology itself that had proportions of both being parochial but global. In order to evidence this idea of scalability, these four cases that make Scotland's ecology a uniquely attractive one to conduct research were examined, and demonstrated that Scotland had a viable population for: medical research and clinical trials; genetic and informatics consolidation and advances; and an evidence base demonstrating that the identification and recruitment of individuals or groups within the Scottish population could be accomplished and result in important clinical discoveries.

We conclude that devolution in terms of impact on the way that Scotland is promoted as a unique ecology in which to do medical research can, up to this point, be characterised more as an evolution of ecology and revolution of narrative. The ability of academic and policy leaders in Scotland to demonstrate that the confidence is not misguided through developing programmes, such as SHIP, Generation Scotland and SHARE, plays to the strengths already forged historically in, for example, the WOSCOP study, Diabetes registries and the CHI number, in general. Devolution has allowed different trajectories, but in an evolutionary way. The narrative has allowed for the development of a coherent strategy that links population to research, and to new ways of clinical thinking and practicing. Despite the ability to utilise narratives about how ably placed Scotland is constructions of 'imagined communities' (Anderson, 1991) or national identity do not appear to feed into such arguments - ideas that Scotland has the necessary ecology and health topography does.

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